Research and development of the ADRIANO dual-readout calorimeter and the ORKA detector

Joseph W. Nutter[1, a)]

Department of Physics and Astronomy, Michigan State University, East Lansing, Michigan 48824, U.S.A.

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The ADRIANO calorimeter has been proposed as a way to more precisely measure the energy of subatomic particles produced in particle collisions. One proposed use of ADRIANO is in the ORKA detector, which seeks to precisely measure the branching ratio $K^+ \to \pi^+ \nu\bar{\nu}$. I present a discussion of the construction of a prototype ADRIANO calorimeter. This involves molding leaded glass into the proper shapes required for use in the calorimeter, and, in order to do this effectively, I must use an Arduino microcontroller device to control an industrial press that is used to mold the glass. In addition to the modifications to the press and the construction of the prototype glass tiles, I discuss the calibration of several Photomultiplier Tubes (PMTs), which are used to read the Čerenkov radiation produced as particles pass through the glass. Finally, the completed prototype is used to collect data from cosmic rays.

[a)]nutterj1@msu.edu; Fermi National Accelerator Laboratory, Batavia, Illinois 60510, U.S.A.